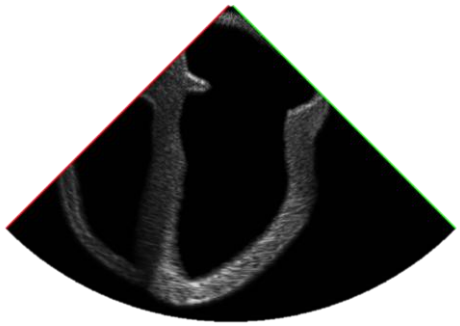
ImFusion is a key innovation player in the domain of medical imaging. Our growing company located in Munich has been contributing to both academic research and private R&D for more than 10 years. More information available on our website **imfusion.com**

Research Internship
Ultrasound Simulation

Project Description

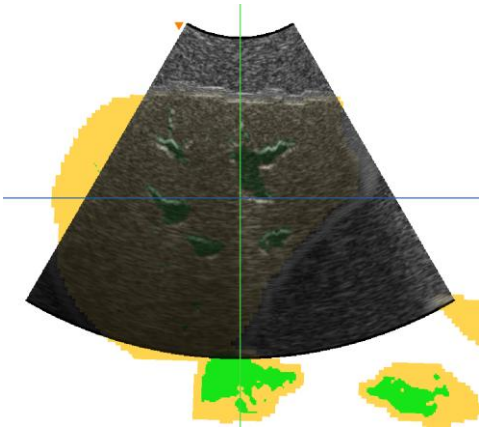


Ultrasound is a key imaging modality in many clinical fields, but large quantities of ultrasound data for training AI models remain difficult to obtain in practice. In addition, simulating realistic ultrasound images from other modalities is known to be computationally expensive, as the interactions between sound waves and biological tissues are governed by complex partial differential equations.

At ImFusion, we have multiple algorithms at hand to generate ultrasound-looking images either from CT contrast directly, or via segmentation maps and a hybrid raytracing / speckle painting technique [1]. While these methods are suited to mimic ultrasound physics to some degree, the produced images fail in allowing AI models to generalize to real ultrasound acquisitions.

In this internship / MSc thesis projects, we will focus on:

- Implementation (and potential improvement) of the latest ultrasound simulation techniques from the literature [2-3].
- Investigations on how to best integrate simulated images into AI model training pipelines to ensure domain transfer and generalizability.



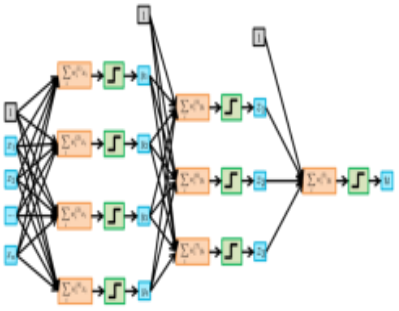
The intern will have the freedom and opportunity to learn and work on these components. The goal of this internship is to write a scientific paper and/or improve our product. This internship is a paid position for a duration of 6 months and will take place in Athens (at university/remotely).

[1] Salehi, Mehrdad, et al. "Patient-specific 3D ultrasound simulation based on convolutional ray-tracing and appearance optimization." MICCAI 2015

[2] Garcia, Damien. "SIMUS: an open-source simulator for medical ultrasound imaging. Part I: theory & examples." Computer Methods and Programs in Biomedicine 218 (2022): 106726.

[3] Amadou, Abdoul Aziz, et al. "Cardiac ultrasound simulation for autonomous ultrasound navigation." Frontiers in Cardiovascular Medicine 11 (2024): 1384421.

Your Profile



- Last year student in an engineering school or relevant master program
- Proficiency in Python and Deep Learning frameworks, C++ is a plus
- Curiosity and interest for state-of-the-art research in machine learning and image processing
- Motivation to contribute to the medical imaging field
- Ability to work independently
- Proficiency in English

Application Process

Shortlisted candidates will be contacted for a technical interview consisting of a Python programming exercise and a scientific discussion.

To apply, send your CV / Cover Letter to **zettinig@imfusion.com**